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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,053	08/28/2006	Peter Geskes	10060148PUS1	7572
60601 7590 10/12/2010 Muncy, Geissler, Olds & Lowe, PLLC 4000 Legato Road Suite 310 FAIRFAX, VA 22033				
EXAMINER FLANIGAN, ALLEN J				
ART UNIT		PAPER NUMBER		
3744				
MAIL DATE		DELIVERY MODE		
10/12/2010		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/566,053

Applicant(s)

GESKES ET AL.

Examiner

Allen J. Flanigan

Art Unit

3744

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 August 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 and 23-36 is/are rejected.
- 7) ☒ Claim(s) 22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SI/22)
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date: _____

The Finality of the previous Office Action is hereby withdrawn for the purpose of making new grounds of rejection.

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “profile free bending portion” and the “bending region blocked with solder” of claim 22, and the “openings interrupting said wavy profile” of claim 35 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required

corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Formal drawings in compliance with 37 CFR 1.121(d) are required in this application because the drawings provided by the applicant are of such poor quality that they fail to clearly show various claimed features (i.e. the "regions of curvature" 16 of claim 1, the "flat region on the outside of a wave back" of claim 5, etc.).

Claims 3, 24, and 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The wording of claim 3 as amended is not understood, i.e. "the wavy profile comprises the length of the legs, by the leg angle defined by the legs" etc. It would appear that the applicants may have intended to indicate that "the configuration of the wavy profile is characterized by" (*cf* claim 4). Regarding claim 24, there is no antecedent basis for "the main direction of extent" in claim 1.

Regarding claim 25, this claim recites two dimensions, one being within a range of between 1 and 2 mm, and one being 3 mm. It is not clear whether the claim scope is meant to cover either, or both, of these recited dimensional values.

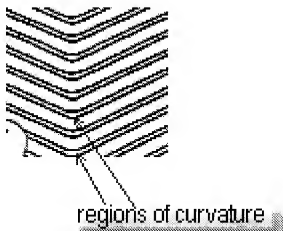
The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 11, 12, 17-21, 23, 26, and 28-36 are rejected under 35 U.S.C. 102(b) as being anticipated by Karlsson et al.

Karlsson et al. show a plate heat exchanger in which the plates are provided with a “pressed pattern (9)” (note in regard to the embossing step of claim 30) of corrugated profiles comprising rectilinear portions joined by curved portions (see Fig. 12, for example) that read on the claimed “regions of curvature”.



Adjacent plates are reversed to provide points of contact (see Fig. 8) which inherently define meandering flow patterns. The plates are brazed

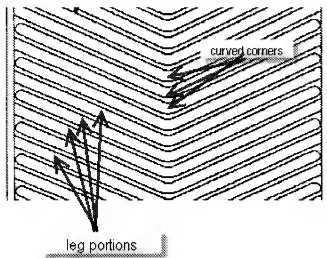
together at their points of contact. Regarding the recitation that the plates “have a recurring wavy profile” in claim 1, see Figs. 14 or 17 of Karlsson et al., showing the wavy profile of the plate when viewed in cross section. Regarding claim 2, the corrugated profile will indeed appear wavy when viewed transverse to the flow direction between the inlet and outlet openings (i.e. when viewed along a transverse cross section of the plate parallel to line XVI).

Regarding claims 11 and 12, see the figures of Karlsson et al. Regarding claim 23, note plates 1 and 8 of Karlsson et al.

Regarding claim 26, reciting “uniform distribution” of the contact points between plates, see Fig. 8 of Karlsson et al.

Regarding claims 28 and 29, these claims concern the intended use of the claimed device and fail to structurally distinguish over the prior art. At most such functional recitations require the prior art be capable of use in the intended manner; clearly the heat exchanger of Karlsson et al. could be used in any heat exchange application (including phase change applications) and in any desired orientation. Regarding claim 33, the profile provided on each plate of Karlsson et al. clearly contains at least three curved corners (three regions of

curvature) and four leg portions.



Regarding claim 35, any of the ports 10, 11, 12, 13 of the plates of Karlsson et al. read on the claimed “at least two openings interrupting the wavy profile”.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Karlsson et al.

Karlsson et al. indicate that channel plates are “made of thin sheets of a material . . . conductive to heat – e.g. a metal.” Aluminum is an extremely well known heat conductive metal for forming components such as tubes and plates in heat exchanger construction, and the Examiner hereby takes Official Notice of the fact. It would have been obvious to one of ordinary skill in the art at the time the instant invention was made to form the plates of Karlsson et al. out of aluminum.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Karlsson et al. in view of US patent # 4630674 to Skoog (hereinafter "Skoog '674") and US patent # 3817324 to Andersson (hereinafter "Andersson '324").

It is known in the art of corrugated stamped plate heat exchangers to flatten the crests/troughs of the corrugations as shown in Skoog '674 and Andersson '324. Such a profile will inherently increase the surface to surface contact occurring where protruding ridges or crests of adjacent plates overlap; it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to provide such flattened crests in the heat exchanger of Karlsson et al. if a stronger plate to plate bond were desired.

Claims 6-9, 14, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karlsson et al. in view of Kivikas et al. and US patent # 6823934 to Andersson (hereinafter "Andersson '934").

Andersson '934 teaches that the specific dimensions of corrugated ridged profiles provided in such plate heat exchangers are recognized in the art to be result effective variables (see lines 16-28 of column 7 of Andersson '934). The discussion of "relative distance" and "profile" is considered to implicitly allude to the depth of the grooves in profile; Kivikas et al. further specifically acknowledge the result-effective nature of varying the groove depth and angle in such corrugated plates (bridging paragraph of columns 2-3 of Kivikas et al.). Thus, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to vary or optimize the relative parameters of

the groove pattern of Karlsson et al. depending on the intended fluids, flow speeds, and desired performance parameters of a given application. See MPEP 2144.05 II, "**OPTIMIZATION OF RANGES**". Regarding claim 27, selecting some of these parameters (such as groove/ridge width or spacing and angle) will inherently determine the density or concentration of contact points between adjacent plates in the stack.

Regarding claim 14, see the bridging paragraph of columns 5-6 of Andersson '934. It would have been obvious to one of ordinary skill in the art at the time the instant invention was made to form the ports of Karlsson et al. in a noncircular shape depending on the types of fluid meant to be used in the exchanger as suggested in Andersson '934.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Karlsson et al. in view of WO 85/02670 to Bergqvist et al.

It is known in such plate heat exchanger designs as shown by Bergqvist et al. to provide additional inclined corrugations with ridges that are at a different (steeper) angle compared to the main body in the end regions to act as distribution fields for the fluid flowing between the plates, and it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to adopt such differently angled corrugations in the regions adjacent the corners or ends of the plates of Karlsson et al. to help uniformly distribute the fluid across the interplate flow field.

Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karlsson et al. in view of US patent # 4489778 to Skoog (hereinafter "Skoog '778").

It is known in the art as shown by Skoog '778 to alternate plates that have different ridge angles so as to "obtain passages of different thermal lengths", to accommodate different fluids flowing within the passages of the plate stack. Thus, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to do the same in Karlsson et al., forming every other plate with ridges at an angle differing from those in the adjacent plate as taught in Skoog '778.

Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karlsson et al. in view of Mosher and Munoz.

Hydraulic diameter is a parameter of fundamental concern for designers of heat exchangers. One skilled in the art recognizes that individual passage hydraulic diameter will profoundly affect factors such as the pressure drop of the device. See Mosher, bridging paragraph of columns 2-3 indicating that D_h is an important factor dictating plate design in such stacked plate heat exchangers. Munoz teach that a hydraulic diameter range of 1-3 mm is preferred, for example, for using stacked corrugated plate heat exchangers for cooling oil. Thus, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to select any desired hydraulic

diameter for the passages of Karlsson et al. depending on the desired application.

Applicant's arguments with respect to the above-rejected claims have been considered but are moot in view of the new ground(s) of rejection.

Claim 22 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kovalenko et al. shows a corrugated plate for a heat exchanger with curved regions where the leg angles join. Persson is cited in regard to claim 22.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen J. Flanigan whose telephone number is (571) 272-4910. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on (571) 272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Allen J. Flanigan/
Primary Examiner, Art Unit 3744